

**COSTS OF PRODUCING FIELD RAPID-GROWING
EVERGREENS (JUNIPERUS) IN OHIO**

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ABSTRACT

The objective of this study was to determine annual production costs for field-grown rapid-growing evergreens in Ohio by size of firm. This objective was accomplished by synthesizing two model field nurseries using an economic engineering approach. Once the nurseries were simulated, growing space was divided into five equal parts with each segment being assigned a plant group. In the 50-acre nursery, rapid-growing evergreens were allocated 8 acres of growing space and in the 200-acre nursery 35 acres. One specific species of rapid-growing evergreen (*Juniperus*) was chosen for detailed analysis.

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In the space allocated, 5,810 salable Juniperus, of size 18-24 inches, could be produced annually in the 50-acre nursery and 25,418 in the 200-acre. Based on 1985 figures total costs per salable plant were \$12.51 in the 50-acre nursery and \$7.09 in the 200-acre.

INTRODUCTION

Rapid-growing evergreens, such as the various species of Juniperus and Thuja, have long been planted for hedges, foundation plantings, and other locations where rapid growth is desirable. These plants have traditionally been grown in the field. However, new technological developments are now making it economically feasible to grow them in containers. Container production allows greater flexibility in production and marketing, and, in most cases, is less expensive than field production. On the other hand, field-grown plants have greater tolerance against variations in moisture, nutrients, and temperature. When subjected to conditions that would kill or severely damage container-grown plants with no overwintering protection, field-grown plants will often survive with little damage. It is also easier to "hold-over" field grown plants when market conditions are not favorable. It is anticipated that the majority of rapid-growing evergreens will continue to be produced in the field for the foreseeable future, especially the largest plants.

MATERIAL AND METHODS

In the study, two model firms were simulated using the conceptual framework of economic engineering wherein the 'best proven practice' was included in each model. The analysis is based on conditions in Central Ohio. The complete synthesis included developing an appropriate production cycle; schematic drawings of the physical layout, including buildings and irrigation systems; lists of equipment and other items; a complete sequence by month and year of nursery operational steps beginning with propagation and ending with loading the finished product for wholesale distribution; and budgets for fixed and variable costs.

Data for this study were obtained in 1985 from wholesale nurseries and nursery suppliers in Ohio. The basic goals in simulating the production facilities were to minimize labor expenses, flow and movement of plant material and equipment, water runoff, and initial investment, as well as to maximize the number of salable plants and keep future expansion possible. See Taylor et al. (1) for a detailed analysis of the physical plant, production system, and capital production budgets.

The first step in the production cycle consisted of collecting cuttings from field plants that were at least three years old. Cuttings were trimmed and treated with a hormone solution and stuck in a heated sand bed in an "overwintering" house. During March of the second production year, the 6 month old rooted cuttings are pulled from the propagation beds, root

pruned by hand, and planted 7" within rows, 20" apart between rows, in four feet wide beds. After two years in the beds, they are dug, root and top pruned by hand, and planted in the field. Approximately 25% of the field-grown crop is harvested and sold during the fall of the fourth field production year and another 25% dug, overwintered and sold during late Winter and early Spring of the fifth field production year. The remaining 50% of the crop is harvested and sold during late Winter and Spring of the fifth field production year. After the harvest is complete, the land is left fallow and disked for weed control four times during summer months. The fields were plowed in the fall of the fifth production year in preparation for spring planting.

A model facility was simulated for both a 50-acre and a 200-acre field nursery. The nursery operations were assumed to produce a diverse line of nursery stock each having its own unique production cycle. Commonly grown nursery stock was divided into five cultural groups. While not all inclusive, the groups do permit developing a range of per unit costs related to input costs and cultural factors. For analytical purposes, it was assumed that each cultural group would occupy 20% of the field growing area (i.e. 50-acre nursery = 8 acres per group, 200-acre nursery = 35 acres per group. In addition to the field growing area, the 50-acre nursery had 10 acres and the 200-acre nursery 25 acres of production facilities including overwintering houses, propagation facilities, shipping area, holding area, liner bed area, pond, supply shed, machinery storage, machine

shop, office, and rest rooms. Costs developed on rapid-growing evergreens (Juniperus) therefore were based on the scale of complete nurseries, but were analyzed on the basis of percent of total space occupied. Companion studies were reported in the 1987 issue of "Ornamental Plants" (2). Fixed costs were reported beginning on page 26, costs for slow-growing evergreens (page 37), costs for deciduous shrubs (page 45), and costs for shade trees (page 51). In this publication costs for ornamental trees are reported beginning on page ____.

For detailed analysis on rapid-growing evergreens, one specific plant type (Juniperus) was chosen. While it is recognized that other slow growing evergreens (i.e. Thuja) would have somewhat different requirements, it was felt that they would not vary significantly in cost from Juniperus.

Costs were established for all factors of production including management and invested capital. In economic terms, costs associated with factors of production supplied by owner/operators are often referred to as 'opportunity costs' or the income these factors could have received if they were employed elsewhere. For example, owners could usually be employed as managers at other nurseries, and money invested inland, buildings, irrigation systems, and equipment could have earned interest if in financial institutions.

Capital requirements for establishing the nurseries were first determined (1). Second, capital requirements per salable plant capacity by size of nursery were established (1). Third,

annual fixed costs were calculated (1). Fourth, annual variable costs were determined for each of the two sized nurseries (Tables 1-3). Fifth, summaries were made for annual fixed and variable costs according to size of nursery (Table 4). This allowed cost comparisons based on size of nursery.

Most nurseries use cash rather than accrual accounting procedures. For this reason, the analyses were completed on a "cash" basis. This approach does not give a true economic picture of the cost of producing a plant as it does not take into account the time value of money from planting until harvest. The analyses do, however, give a reliable estimate of the annual cost per salable plant based upon the study's assumptions.

Total annual production costs consist of both fixed and variable factors. Fixed costs are primarily made up of implicit costs such as depreciation on buildings and equipment, interest charges (both for borrowed and equity capital), and charges for management. Many nurserymen do not adequately consider fixed costs when computing costs of production. Fixed items are often considered as residual claimants on income. For example, management is compensated if all other factors of production have been paid and there is still a residual. As noted previously, annual fixed costs are discussed in greater detail in a companion article.

Variable Costs

Variable costs are comprised of all expenses that vary with

the quantity of plants being grown. Variable costs are explicit, obvious, and normally paid out yearly. An example of variable costs is the amount of burlap that would be needed yearly for harvesting Juniperus in a ball & burlap operation. Variable costs were subdivided into the following categories: propagation, materials, machinery and equipment, labor, and interest on operating capital (Tables 1 and 2).

Propagation. Propagation costs included rooting media (sand), labor for collecting, stripping, sticking, maintainance, harvesting, and for hormone powder.

Burlap and twine. Nails, burlap and twine were provided for "ball and burlapping" each plant produced. The cost of the nails, burlap and twine reflects a delivered cost to the nursery.

Polyethylene film. The cost of the white copolymer film delivered to the nursery.

Strip tags. Strip tags were provided for identifying plants by botanical name, common name, state plant was grown in, and nursery producer. Costs include printing and shipping charges.

Chemicals. Chemical costs were organized around three cultural programs. The first is fertilizer. For field operations the price included custom spreading for a custom blend of fertilizer and for lime. Price for urea included delivery to the nursery. The second is herbicide, whose cost is the purchase price of the various pre-emergence and post-emergence materials. The third combines insecticides and fungicides. Purchase price reflects total cost for the chemicals quoted by local

distributors. A special category of "other" was included under chemicals. Adequate chemicals were budgeted for normal control of insects and diseases. The "other" category budgeted at 50% of the cost of the "normal" insecticides and fungicides was to handle special problems.

Machinery and equipment. Variable machinery and equipment costs represent all costs incurred while equipment and machinery is in use. These costs include repair, fuel and lubrication/filters (Table 3). Repair cost per hour was calculated by multiplying initial cost by a stated repair percentage divided by the estimated lifetime use of the machinery in the 200-acre nursery in hours. The same repair cost per hour was used for both sized nurseries. Fuel costs were determined by multiplying units of fuel used per hour by the price per unit. Filter/lubrication cost was estimated at a constant factor of 15% of calculated fuel costs. Summation of repair, fuel and filter/lubrication costs result in total variable cost per hour of machinery or equipment useage.

Hourly labor. The hourly basic wage was estimated at \$5.25. An additional 32% or \$1.68 was allocated for fringe benefits making a total hourly labor cost of \$6.93. Each major production activity was allocated necessary labor hours to accomplish assigned tasks.

Cost Summaries

After all cost factors were determined, they were summarized

based upon cost per salable plant by size of nursery.

RESULTS AND DISCUSSION

Annual fixed, variable, and total production costs of producing slow growing evergreens (Juniperus) in the field in Ohio for 1985 are summarized in Table 4. In the 50-acre nursery, total annual costs were \$72,614 or \$12.51 per salable 18-24 inch plant. Fixed costs totaled \$46,902 or \$8.08 per plant and made up 65% of total costs. Based on percentage of total costs, land and improvements made up 10%, buildings 7%, machinery and equipment 18%, general overhead 28%, and interest on general overhead, insurance, and taxes 2%. Variable costs totaled \$25,712 or \$4.43 per plant and made up 35% of total costs. Based on percentage of total costs, propagation made up 2%, materials 6%, machinery and equipment 8%, labor 17%, and interest on operating capital 2%.

In the 200-acre nursery, total annual costs were \$180,564 or \$7.09 per salable 18-24 inch plant. Fixed costs totaled \$88,905 or \$3.48 per plant and made up 49% of total costs. Based on percentage of total costs, land and improvements made up 12%, buildings 4%, machinery and equipment 14%, general overhead 18%, and interest on general overhead, insurance, and taxes 1%. Variable costs totaled \$91,659 or \$3.61 per plant and made up 51% of total costs. Based on percentage of total costs, propagation made up 1%, materials 11%, machinery and equipment 7%, labor 29%, and interest on operating capital 3%.

Total annual costs were \$5.42 per plant more in the 50-acre nursery than in the 200-acre. Of this \$5.42, \$4.60 or 85% were comprised of fixed costs. On a per item basis, the 200-acre nursery's advantages were 37 cents on land and improvements, 55 cents on buildings, \$1.27 on machinery and equipment, \$2.26 on general overhead, and 15 cents on interest for general overhead, insurance, and taxes. The 82 cent difference for variable costs was 16 cents for propagation, (-2) cents for material, 56 cents for machinery and equipment, 8 cents for labor, and 4 cents for interest on operating capital.

In the nurseries analyzed, it cost 43% less to produce a 18-24 inch salable rapid-growing evergreen (Juniperus) in the 200-acre nursery than in the 50-acre. While the overall reduction was 43%, it was 57% for fixed costs and only 19% for variable. Large-sized commercial field nurseries are able to make more efficient use of buildings, equipment, machinery, labor, and general overhead than could small field nurseries.

One note of caution should be observed in comparing costs between the two sized nurseries. Each of the nurseries were analyzed based on the assumption that they would produce a diverse line of plants which included both shrubs and trees. This assumption might be unrealistic for the 50-acre nursery as a considerable amount of specialized equipment was required. It should also be noted that many operators of small nurseries might choose a different line of equipment than that budgeted. While the equipment budgeted is labor saving, smaller nurserymen might

have a surplus of family labor and choose less expensive, less labor saving equipment. Also, a small nursery might well operate its office out of a home.

Individual nurserymen might well experience, or at least calculate, costs differently from those depicted here. Most cost differences would probably be reflected in fixed rather than variable costs. Most fixed costs are implicit and their full impact may not be calculated by established nurserymen. Budgets presented assumed new facilities, machinery, and equipment. Most nurserymen have owned their land for many years and have old machinery and equipment. For the established nursery, budgeted fixed costs on land improvements, buildings, machinery, and equipment presented here would reflect replacement rather than 'book' value of depreciated items. Presented fixed costs also placed a market value on management. Many nurserymen place little if any value on their own management when computing costs. Variable items, on the other hand, are explicit, experienced at least yearly, and easily accounted for. Variable costs presented here would be typical for the industry in Ohio and should be rather consistent regardless of age and size of the nursery.

IMPLICATIONS

Total annual costs per 18-24 inch salable slow growing evergreen (Juniperus) were \$12.51 in the 50-acre field nursery and \$7.09 in the 200-acre field nursery. Fixed costs were \$8.08 in the 50-acre nursery and \$3.48 in the 200-acre for a

differential of \$4.60 per salable plant. Variable costs, were \$4.43 in the 50-acre and \$3.61 in the 200-acre for a differential of 82 cents. These plant costs assumed propagation in the nursery (6 months), liner production in beds (2 years), and field growing (4 years), ball and burlapped harvesting, and an average size of 18-24 inches per salable plant.

These figures demonstrated that variable costs on a salable plant basis, at least over the size range of nurseries analyzed, were about 19% less when going from a 50-acre nursery to a 200-acre. This reduction was primarily accounted by efficiencies gained in propagation, and machinery and equipment. Fixed costs were reduced significantly as size of nursery was increased. This occurred because most of the fixed factors required to operate the 50-acre nursery, such as management, buildings, and most machinery and equipment, were also adequate to operate the 200-acre. As the size of nursery increased, costs for fixed items of production were spread over more salable units, thereby reducing the fixed cost per plant.

LITERATURE CITED

1. Taylor, Reed D., Harold H. Kneen, Elton M. Smith, David E. Hahn, and Stanley Uchida. 1986. Costs of Establishing and Operating Field Nurseries Differentiated by Size of Firm and Species of Plant in U.S.D.A. Plant Hardiness Zones Five and Six. Southern Coop. Ser. Bull. 315.

2. Ornamental Plants--1987: A Summary of Research. Ohio Agr. Res. and Dev. Ctr. Circ. 291, Jan, 1987.

TABLE 1.--Variable Costs (Dollars) for Rapid-Growing Evergreens (Juniperus) for a 50-Acre Field Nursery, Field Nursery in Ohio, 1985.

Item	Description	Unit	Cost per Unit**	Quantity	Total Variable Cost
Propagation***					
Rooting media	Sand	cubic yd.	6.50	12.00	78
Collecting, stripping & sticking	11,107 @ 700/hr.	hrs.	6.93****	6.60	46
Maintenance	25% of total prop. maint. hrs.	hrs.	6.93	182.50	1,265
Harvest	11,107 @ 500/hr.	hrs.	6.93	22.21	154
Hormone powder	#3, I.B.A.	lbs.	11.70	0.32	4
Subtotal					1,547
Materials					
Field pot	32" x 32" squares + twine	each	0.45	5,810.00	2,615
Polyethylene film	4 mil white, 32' x 225'	each	127.50	1.45	185
Strip tags	5/8" X 7" plastic strip tag	each	0.02	5,810.00	116
Chemicals	Custom spread, custom blend: 45-0-0, 0-44-0, 0-0-60 (fertilizer)	ton	176.00	1.02	180
	Custom spread, (lime)	ton	20.00	1.80	36
	Urea, 45-0-0 (fertilizer)	ton	220.00	0.88	194
	Soluble 20-20-20 (fertilizer)	ton	1,411.20	0.12	169
	Trifluralin 4 EC (Treflan) (herbicide)	gallon	33.49	0.45	15
	Simazine 80WP (Princep) (herbicide)	pound	3.75	13.00	49
	DCPA 75WP (Dacthal) (herbicide)	pound	6.37	36.40	232
	Malathion, 57EL, (Cythion) (insecticide)	gallon	18.28	11.70	214
	Benomyl, 50 WP, (Benlate) (fungicide)	pound	14.17	19.50	276
	Carbaryl, 80WP (Sevin) (insecticide)	pound	6.09	7.80	48
	Chlorothalonil 10M cu. ft.(Termil) (fung.)	canister	1.76	4.55	8
	Other (i.e. Kelthane, Captan, Di-syston, Orthene, etc.)*****				
Subtotal					4,337
Machinery and Equipment					
	Tractor, 100 HP	hour	17.00	24.29	413
	Tractor, 34 HP	hour	4.99	37.31	186
	Articulated Loader/3,000 lbs.	hour	14.81	49.77	737
	Fork	hour	0.01	49.77	1
	Plow, 3-14"	hour	6.57	1.44	9
	Disk, 8' wide	hour	4.23	3.48	15
	Harrow, 10' wide	hour	8.45	0.21	2
	Cultimulcher, 10' wide	hour	24.74	0.38	10
	Spray rig with 10' boom	hour	2.77	2.14	6
	Transplanter, 3 row	hour	26.79	1.71	46
	Permanent irrigation\ well & pump 100HP	hour	7.60	63.20	480
	Inground irrigation - bed area	hour	3.13	48.00	150
	Above ground irrigation - bed area	hour	1.83	48.00	88
	Inground irrigation - storage & holding	hour	5.65	12.00	68
	Above ground irrigation - storage & hold.	hour	11.05	12.00	133
	Traveler gun	hour	12.06	3.20	39

Table 1 Cont.

Item	Description	Unit	Unit**	Quantity	Cost
	Portable PTO pump, 40 HP	hour		(no costs budgeted)	
	Airblast sprayer	hour	1.01	15.60	16
	Fertilizer injector	hour	12.39	3.00	37
	Transplanter, 2 row	hour	12.0	2.84	34
	Undercutter, bed	hour	1.16	1.64	2
	Sidedresser, 2 row	hour	0.63	4.80	3
	Cultivator, 2 row	hour	0.95	9.51	9
	Wagon, 4 wheel	hour	0.48	15.12	7
	Cultivator, 3 row	hour	13.93	1.32	18
	Truck, 1/2 ton pickup	hour	8.42	346.67	2,919
	Flatbed truck, 24' bed	hour	14.87	36.47	542
Subtotal					5,970
Labor					
	Labor hours	hour	6.93****	1,491.56	10,337
	Related labor hours, 20%	hour	6.93	298.00	2,065
Subtotal					12,402
Interest Charge on Operating Capital	Computed at 12% on an annual basis for 6 months	percent	6.0 (0.06)	24,256.00	1,456
Total Variable Costs					25,712
Variable Cost per 18-24 Inch Salable Plant	Units available for sale in a given year	each		5,810.00	4.42

*Total Nursery - 50 acres, 40 acres of growing space, 10 acres production facilities, holding & field bed area, roads, etc.
 Rapid Growing Evergreens - 10 acres, 8 acres of growing space, 2 acres production facilities, holding & field bed area, roads, etc., 5,810, 18-24 inch salable plants per year.

**Quantity discounts were applied to chemicals and other items.

***11,107 plants would be stuck in the propagation house where about 23% would be lost leaving 8,544 for transplanting into liner beds. About 20% of the plants in the liner beds would be lost leaving 6,835 for transplanting into the field.

****Average basic wage before withholding taxes and fringes \$5.25, taxes and fringes add 32% or \$1.68 for a total of \$6.93.

*****To achieve better pest and disease control, alternative chemical useage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Benomyl, and Carbaryl.

TABLE 2.—Variable Costs (Dollars) for Rapid-Growing Evergreens (Juniperus) for a 200-Acre Field Nursery in Ohio, 1985.

Item	Description	Unit	Cost per Unit**	Quantity	Total Variable Cost
Propagation***					
Rooting media	Sand	cubic yds.	6.50	24.00	156
Collecting, stripping & sticking	48,594 @ 700/hr.	hrs.	6.93****	69.42	481
Maintainance	25% of total prop. maint. hrs.	hrs.	6.93	200.00	1,386
Harvest	48,594 @ 500/hr.	hrs.	6.93	97.19	674
Hormone powder	#3, I.B.A.	lbs.	11.70	1.39	16
Subtotal					2,713
Materials					
Burlap	32" x 32" squares + twine	each	0.45	25,418.00	11,438
Polyethylene film	4 mil white, 32' x 225'	each	127.50	6.35	810
Strip tags	5/8" X 7" plastic strip tag	each	0.02	25,418.00	508
Chemicals	Custom spread, custom blend: 45-0-0, 0-44-0, 0-0-60 (fertilizer)	ton	176.00	4.44	781
	Custom spread, (lime)	ton	20.00	4.95	99
	Urea, 45-0-0 (fertilizer)	ton	220.00	4.95	1,089
	Soluble 20-20-20 (fertilizer)	ton	1,411.20	0.52	734
	Trifluralin 4 EC (Treflan) (herbicide)	gallon	33.49	1.97	66
	Simazine 80WP (Princep) (herbicide)	pound	3.75	61.10	229
	DCPA 75WP (Decthal) (herbicide)	pound	6.37	159.04	1,013
	Malathion, 57EL, (Cythion) (insecticide)	gallon	18.28	48.59	888
	Benomyl, 50 WP, (Benlate) (fungicide)	pound	14.17	32.36	459
	Carbaryl, 80WP (Sevin) (insecticide)	pound	6.09	80.90	493
	Chlorothalonil 10M cu. ft.(Termil) (fung.)	canister	1.76	19.05	34
	Other (i.e. Kelthane, Captan, Di-syston, Orthene, etc.)*****				920
Subtotal					19,561
Machinery and Equipment					
	Tractor, 100 HP	hour	17.00	26.23	446
	Tractor, 60 HP	hour	11.68	79.25	926
	Tractor, 34 HP	hour	4.99	142.18	709
	Articulated Loader/2,000lbs	hour	6.67	49.88	333
	Articulated Loader/3,000lbs	hour	14.81	49.88	739
	Forks	hour	0.01	99.67	1
	Plow, 3-14"	hour	6.57	6.29	41
	Disk, 8' wide	hour	4.23	10.84	46
	Harrow, 10' wide	hour	8.45	0.94	8
	Cultimulcher, 10' wide	hour	24.70	1.65	41
	Spray rig with 10' boom	hour	2.77	9.37	26
	Transplanter, 3 row	hour	26.79	7.48	200
	Permanent irrigation\ well & pump 100HP	hour	7.60	88.00	669
	Inground irrigation - bed area	hour	3.13	62.00	194
	Above ground irrigation - bed area	hour	1.83	62.00	113
	Inground irrigation - storage & holding	hour	5.65	12.00	68
	Above ground irrigation - storage & hold.	hour	11.05	12.00	133
	Traveler gun	hour	12.06	14.00	169

Table 2 Cont.

Item	Description	Unit	Cost per Unit**	Quantity	Total Variable Cost
	Portable PTO pump, 40 HP	hour		(no costs budgeted)	
	Airblast sprayer	hour	1.01	68.16	69
	Fertilizer injector	hour	12.39	3.00	37
	Transplanter, 2 row	hour	12.00	12.46	150
	Undercutter, bed	hour	1.16	7.19	8
	Sidedresser, 2 row	hour	0.63	21.00	13
	Cultivator, 2 row	hour	0.95	41.58	40
	Wagon, 4 wheel	hour	0.48	66.20	32
	Cultivator, 3 row	hour	13.93	5.68	79
	Truck, 1/2 ton pickup	hour	8.42	520.00	4,378
	Flatbed truck, 24' bed	hour	14.87	159.48	2,371
Subtotal					12,039
Labor					
	Labor hours	hour	6.93***	6,271.93	43,465
	Related labor hours, 20%	hour	6.93	1,254.38	8,693
Subtotal					52,158
Interest Charge on Operating Capital	Computed at 12% on an annual basis for 6 months	percent	6.0 (0.06)	86,471.00	5,188
Total Variable Costs					91,659
Variable Cost per 18-24 Inch Salable Plant	Units available for sale in a given year	each		25,418	3.61

*Total Nursery - 200 acres, 175 acres of growing space, 25 acres production facilities, holding & field bed area, roads, etc.
 Rapid-Growing Evergreens - 40 acres, 34 acres of growing space, 6 acres production facilities, holding & field bed area, roads, etc., 25,418, 18-24 inch salable plants per year.

**Quantity discounts were applied to chemicals and other items.

***48,594 plants would be stuck in the propagation house where about 23% would be lost leaving 37,380 for transplanting into liner beds. About 20% of the plants in liner beds would be lost leaving 29,904 for transplanting into the field.

****Average basic wage before withholding taxes and fringes \$5.25, taxes and fringes add 32% or \$1.68 for a total of \$6.93.

*****To achieve better pest and disease control, alternative chemical useage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Benomyl, and Carbaryl.

TABLE 3.—Estimated Variable Cost per Hour of Use for Machinery and Equipment for Field Nurseries, in Ohio, 1985.

Item Number	Item	New Cost (dollars)	Expected Life (years)	Estimated Annual Use		Estimated Cost per Hour of Use			Total (dollars)
				50 Acre* Nursery (hours)	200 Acre** Nursery (hours)	Repairs*** (dollars)	Fuel**** (dollars)	Lubrication and Filter (dollars)	
1	Tractor, 75 HP	28,278	10	217	494	5.15	10.30	1.55	17.00
2	Tractor, 60 HP	20,419	10	—	583 ea	3.15	7.42	1.11	11.68
3	Tractor, 34 HP	14,504	10	169	632	2.07	2.54	0.38	4.99
4	Flatbed truck	42,000	10	383	1,702	2.22	11.00	1.65	14.87
5	Articulated Loader/2,000lbs	25,000	10	—	600	3.75	2.54	0.38	6.67
6	Articulated Loader/3,000lbs	38,000	10	328	600	5.70	7.92	1.19	14.81
7	Tree Spade	8,490	2	181	641	5.30			5.30
8	Forks for loaders	1,100	10	328	1,200	0.01			0.01
9	Plow	2,616	10	8	32	6.57			6.57
10	Disk	3,900	10	15	60	4.23			4.23
11	Harrow	650	10	2	5	8.45			8.45
12	Cultimulcher	3,800	10	3	10	24.70			24.70
13	Spray rig (Boom Sprayer)	1,407	7	13	58	2.77			2.77
14	Transplanter, 3 row	7,500	10	5	21	26.79			26.79
15	Transplanter, one row	5,000	10	93	407	0.92			0.92
16	Permanent irrigation, well+pump	36,396	20	221	323	0.56	6.12	0.92	7.60
17	Inground irr. bed-field*****	34,606	20	151	221	3.13			3.13
18	Above ground irr. bed-field*****	4,345	5	144	190	1.83			1.83
19	Inground irr. storage/hold*****	16,957	20	60	60	5.65			5.65
20	Above ground irr. S. & H.*****	8,286	5	60	60	11.05			11.05
21	Traveler*****	22,000	10	17	73	12.06			12.06
22	Portable irr. pump (emergency)	425	10	—	—	—	—	—	—
23	Airblast sprayer	3,600	7	94	406	1.01			1.01
24	Fertilizer injector	858	5	9 ea	9 ea	12.39			12.39
25	Transplanter, 2 row	5,600	10	8	35	12.00			12.00
26	Undercutter - bed	285	7	5	21	1.16			1.16
27	U-Blade - field	240	5	0.38	1.65	17.65			17.65
28	Fertilizer sidedresser	1,000	10	24	103	0.63			0.63
29	Cultivator, 2 row	1,750	7	44	172	0.95			0.95
30	Wagon	1,978	10	57 ea	249 ea	0.48			0.48
31	Cultivator, 3 row	2,250	7	4	15	13.93			13.93
32	Truck - 1/2 ton pickup	13,485	5	1,771	2,779	4.37	3.52	0.53	8.42
33	Mower	2,283	10	9	46	2.98			2.98
34	Seeder	175	10	4	10	1.05			1.05

*50 total acres

**200 total acres

***Repairs per hour were based on usage of the large nursery. They were computed on the basis of percent of new cost over the life of the asset. Percent factors used were: 90 for item numbers 1, 2, 3, 4, 5, 6, 32; 80 for items 9, 13, 23; 75 for items 14, 15, 25, 28; 65 for items 10, 11, 12, 24, 29, 31; 60 for items 26, 27, 30, 33, 34; 40 for items 7, 17, 18, 19, 20, 21, 22; and 10 for items 8, 16. The total was then divided by the estimated total number of hours the equipment would be asset.

****Fuel was estimated at \$ 1.10 per gallon for gasoline driven items, \$1.03 for diesel driven items and \$0.31 per kilowatt for electrical driven.

*****Cost is for a large nursery on which variable costs per hour were based. Cost for the small nursery was lower.

Table 4.--Summary of Annual Fixed, Variable, and Total Costs (Dollars) of Producing Rapid-Growing Evergreens (Juniperus) in the Field in Ohio, 1985.

Item	50 Acre Field Nursery*			200 Acre Field Nursery**		
	Cost	Cost per Salable Plant	Percent of Total Cost	Cost	Cost per Salable Plant	Percent of Total Cost
Fixed Cost Items						
Land and Improvements	7,061	1.22	(10)	21,716	0.85	(12)
Buildings	4,740	0.82	(7)	6,811	0.27	(4)
Machinery and Equipment	13,173	2.27	(18)	25,495	1.00	(14)
General Overhead	20,592	3.54	(28)	32,685	1.28	(18)
Interest on General Overhead, Insurance, and Taxes	1,336	0.23	(2)	2,198	0.08	(1)
Subtotal	46,902	8.08	(65)	88,905	3.48	(49)
Variable Cost Items						
Propagation	1,547	0.27	(2)	2,713	0.11	(1)
Materials	4,337	0.75	(6)	19,561	0.77	(11)
Machinery and Equipment	5,970	1.03	(8)	12,039	0.47	(7)
Labor	12,402	2.13	(17)	52,158	2.05	(29)
Interest on Operating Capital	1,456	0.25	(2)	5,188	0.21	(3)
Subtotal	25,712	4.43	(35)	91,659	3.61	(51)
Total Annual Costs	72,614	12.51	(100)	180,564	7.09	(100)

*Total Nursery - 50 acres, 40 acres of growing space, 10 acres production facilities, holding & field bed area, roads, etc.
Rapid-Growing Evergreens - 10 acres, 8 acres of growing space, 2 acres production facilities, holding & field bed area, roads, etc.

**Total Nursery - 200 acres, 175 acres of growing space, 25 acres production facilities, holding & field bed area, roads, etc.
Rapid Growing Evergreens - 40 acres, 35 acres of growing space, 5 acres production facilities, holding & field bed area, roads, etc.